CHAPTER 188

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Massachusetts
Educational
Assessment
Program

Using the School Reports

MASSACHUSETTS DEPARTMENT OF EDUCATION

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Using the School Reports

The reports which you received from the Massachusetts Educational Assessment Program contain far more than performance "grades." Essentially, they represent a wealth of data about your school. Used in the right way, they can form a basis for program evaluation and curriculum planning. This handbook is designed to help you use them in such a way. It is divided into two sections. The first section describes a process which can help you use the reports to evaluate your instructional program. The second section contains the rationale for the assessment, a description of the reporting categories, and the number of items used to measure each category.

What the Assessment Is and Isn't

We start off by addressing some potential misconceptions:

- The assessment is NOT the ultimate measure of achievement in your school, nor should it be the sole measure of achievement.
- The results are NOT a judgment on the effectiveness of your teaching nor on the intelligence of your students.
- The results are NOT a prediction of the future nor are they independent of the particular group of students who were tested.
- Finally, the results are NOT the same as those which you would receive from commercial testing programs.

The assessment which you administered last spring is different from any testing program which you have previously administered. It is important to understand how it differs.

The content of commercial tests is based on consensus, with items chosen to reflect the knowledge and skills that are common to the curriculum in the majority of schools. These selected items are used to measure how well individual students have learned and understood what they have been taught. Assessments have a different purpose. Assessments are not concerned with the performance of any individual but with knowledge of the subject matter as a whole. For this reason, they reach beyond what is commonly taught in order to encompass all the different kinds of content and processes that are considered appropriate and important in that subject area. What the assessment sacrifices in information about individual students, it gains in the abundance of information it provides about group performance. In this sense, an assessment measures the curriculum, with the proviso that the content tested goes beyond what any one curriculum would be expected to cover.

The reports, then, represent a beginning. They give useful information on how a particular group of your students (the grade tested) performed at a particular time in a wide range of skills and processes, but they can provide much more than that. They can be used as a basis for program improvement in your school. Used in this way, their purpose is not to give answers but to generate questions. The purpose of this handbook is to help you understand the kinds of questions that can be asked and the ways that answers can be found.

I. Evaluating Your Instructional Program

Beginning the Process

The first and most obvious questions will be: How does our student performance compare with some sort of standard? On the average, are we performing better or worse?

There are different ways to answer these questions, depending upon the standard chosen.

1. You can look at your results in the 3 content areas and their major subcategories in relation to the district, your kind of community, or the state as a whole (page 5 of the school and district reports).

   The mean state score is set at 1300, with 68% of school scores lying between 1200 and 1400. Another 16% of the scores are below 1200 and another above 1400. Your score in these content areas will give you a general idea of how students in your school performed on these tests in comparison to the state as a whole.

   The average scores for your Kind of Community and for your district are also given and they, in turn, can be compared with the state mean. Scores that differ less than 50 points should not be considered substantially different, while differences of more than 50 points should be considered meaningful.

2. You can look at your results in terms of the Comparison Score Bands. Because this is a more sensitive measure, these bands have been darkened on the report for easier comparisons. Their purpose is to help you compare the scores of your students with others **in schools like yours**. Comparison Score Bands acknowledge the fact that other factors, beyond the control of schools, affect school performance. (For a more thorough explanation of how Comparison Score Bands were computed and the factors involved, refer to your school or district report, pp. 4-7.) The numbers in the Comparison Score Band give the middle 50% score range of schools like yours. Scores that fall below the band should be examined carefully. They indicate that, in those areas, your students performed less well than other students with similar economic and social backgrounds.

3. You can look at the distribution of scores in your school (p 7) in relation to your total score. This will give you an indication of how well your total scores represent your overall performance. It will tell you how homogeneous your students' performance was. It may help you to identify groups of students who are atypical.

   For example, if your scores were identical to those of the state as a whole, they would be evenly distributed in each quarter. In a similar fashion, if your total score was substantially above or below the state average, the distribution of your scores should reflect this. Does it? Are there disproportionately large numbers of students at the extremes of the distribution? Can you identify those groups? They may need special help (either remedial or enrichment), or you may conclude that, given the circumstances, they are performing to their potential.

These comparisons will give you a general picture of how your school (or district) compares with others in the state on these tests; however, it is not much use in understanding why, or in evaluating your instructional programs. For this, you will have to study the detailed information presented under Curriculum Area Results.

What Are Our Strengths And Weaknesses?

Your score for each subskill is reported under Curriculum Area Results on pp 9-11 of your school report. The number and kinds of items that were used to measure performance on these subskills are listed in Section II of this handbook.

Again, results are also given for the state (set at 1300), your Kind of Community, and your district, so that you have the tools to make comparisons. In the visual display, the diamond indicates the score which your students received, while the bar indicates the relative precision of that score. You will notice that some bars are longer than others. This is a function of several factors: the number of items that were used to measure each subskill, the number of students in your school who took the tests, and the percentage of students answering each item correctly. The bar that surrounds each score is an acknowledgement of the fact that all tests are only estimates of performance; and some are more precise than others. As a consequence, the general rule in comparing scores is to pay particular attention only to those scores which do not have overlapping bars.

The first step in evaluating your program is to examine your performance on the various components of the assessment. In order to do this, you must look at the subskill scores in relation to the overall score which you received in each content area. It will be clearer if you draw a vertical line to represent this overall score. You can then note how the bar for each subskill lies in relation to that line. Bars that fall to the right of the line represent relative strengths, while those that fall to the left signify relative weaknesses.

Don't forget that different categories represent different types of information. For example, in the area of Reading, Passage Types refers to performance in reading different kinds of material, while Comprehension refers to a type of thinking. In Science, items were classified according to Content, Process, and Context. Examples of all the types of classifications and the number of items used to measure each are listed in Section II.

Is This Objective Part of Our Intended Curriculum?

The content of the assessment was determined by two groups: The National Assessment for Educational Progress and Curriculum Advisory Committees, composed of teachers and curriculum directors throughout the state. In addition, a curriculum objectives survey was sent out to all principals in order to verify the appropriateness of the assessment objectives. Needless to say, there was a large divergence in schools' opinions on the importance of some of the objectives. In recognition of this divergence, the Third and Seventh Grade Teacher questionnaires included exemplar items of those topics in Science and Mathematics which showed greatest disagreement. These questionnaires can now be used, along with the exemplars in Section II of this handbook, to compare the specific subskill in each area with your curriculum goals.

A curriculum committee, representative of your professional staff, should be formed to examine your school's INTENDED CURRICULUM. Using the appropriate item exemplars as guides, the committee should consider each of the subskills and ask, *Does the content and the kind of thinking that this subskill indicates match our list of curriculum objectives?*

If the answer is NO, your committee may want to consider whether or not the subskill is appropriate for inclusion in your curriculum at or before this grade level. This will depend, not only upon the characteristics and previous experiences

of your students, but also upon the particular emphasis of your curriculum and the resources available. Remember that the assessment was designed to include all the skills and concepts that are considered appropriate in the subject area tested. Given such a broad scope, it is highly unlikely that any school would be able to cover thoroughly every subcategory, nor would it be productive, given the time available. As a result, each school must decide for itself what aspects of the subject are most relevant and beneficial for their students. On the other hand, it is important to consider your relative performance on the different subskills. Very low scores can be flags for attention. Since the assessment included very easy, as well as very difficult items within each subskill, a very low score suggests that your students may be missing out on fundamental concepts.

Some points to remember in setting priorities:

1. To the greatest extent possible, decide your priorities on the basis of consensus. Unless there is general interest and enthusiasm for the effort, little will be done.
2. Be realistic. Review your textbooks and available materials to make sure that you have the resources to teach the skills and content.
3. Be prepared to spend time and energy preparing yourselves to teach a new area.
4. Take on only as much as you can afford in terms of time and commitment.
5. Don't concentrate on a single year. Skills and knowledge are cumulative.

If the answer is YES, performance results should be indicated as a relative strength. Relatively poor results may suggest that, although the objective is part of the INTENDED curriculum, it is not part of the ACTUAL curriculum. The appearance of a particular topic or skill in a curriculum guide does not assure that it is actually being taught in the individual class. Furthermore, definition of "taught" can differ radically from one class to another. Therefore, before exploring why something has not been learned, start by finding out the extent to which it has been taught.

Is This Objective Part of Our Actual Curriculum?

If the answer is NO:

There are many reasons why content areas are not taught or are taught sketchily. These include lack of time, lack of supporting materials, lack of interest on the part of the teacher or students. Each reason carries its own solution. For example, teachers may believe that the topic is inappropriate for their students or a portion of their students. They may believe that the topic is untimely, or presupposes experiences that children have not yet attained. On the other hand, the skill or topic may not be taught because of lack of resources. Books or appropriate materials may not be available. Teachers themselves may not have sufficient training to feel competent to teach it to the degree that ensures learning. To acknowledge **why** a skill or topic is not being taught is as important as discovering whether or not it is being taught.

In a small setting in which thoughts and feelings can be expressed freely, it may be possible for the group to discuss each of the objectives in turn. In other settings, it may be more useful to conduct a simple written survey, asking each teacher to indicate to what extent (mastery, introductory, or reviewed) each of

the objectives is taught in each of his or her classes. In any event, keep your discussions frank and nonjudgmental. Do not set out with the expectation that every subskill in the assessment (or even in your curriculum guide) can be taught to mastery by every teacher. Instead, keep track of the **reasons why** objectives are not being taught. Consider them as problems to be solved, not as "excuses" for a job not done.

If the answer is YES:

If the objective is in both the INTENDED curriculum and the ACTUAL curriculum, but students are performing poorly in relation to their performance in the subject as a whole, you must ask another set of questions.

Do our students understand the concepts as well as we think they do?

In classroom discussions, if teachers call predominantly on volunteers who know the answer, they may get an inflated impression of how the class is doing as a whole. Some close questionning of a wider group of students may give a more representative assessment of progress.

Are expectations too low?

The assessment found that, in some cases, students used informal knowledge to respond correctly to difficult problems which were not covered in the curriculum. Students may be capable of more than we demand of them.

How well do our own formal and informal assessments confirm these areas of weaknesses?

There is a tendency to rely upon a certain type of question or test for assessment purposes. This may mask difficulties that students have in applying concepts and skills to unfamiliar types of assessment.

Is learning articulated throughout the grades?

Are concepts and skills reinforced across subject areas?

Are home activities encouraged and rewarded?

The state report can be helpful in formulating these questions. It contains the results of analyses which were performed in order to understand some of the factors that relate to achievement. Unalterable ones, such as parental education, language, mobility and community, are beyond the control of the school and are reflected in your Comparison Score Bands. Alterable ones, on the other hand, can be affected by school policy. The state report discusses the varying effects of these factors on performance. For example, not only has homework been found to be related to performance, but teachers' expectation of the homework load was found to be far greater than the actual homework time reported by students. You may wish to use the teachers' questionnaires as the basis for a discussion of how these factors are contributing to performance in your school. The state report is designed to give you general information on teaching and learning for you to relate to your own school practices. The relative strengths and weaknesses in your students' performance can act as a springboard for a much more comprehensive review of your entire school program.

The Final Step (Before the Cycle Begins Again)

In a complex process, such as described here, it is sometimes possible to lose the way. Groups lose touch with each other. Other commitments take

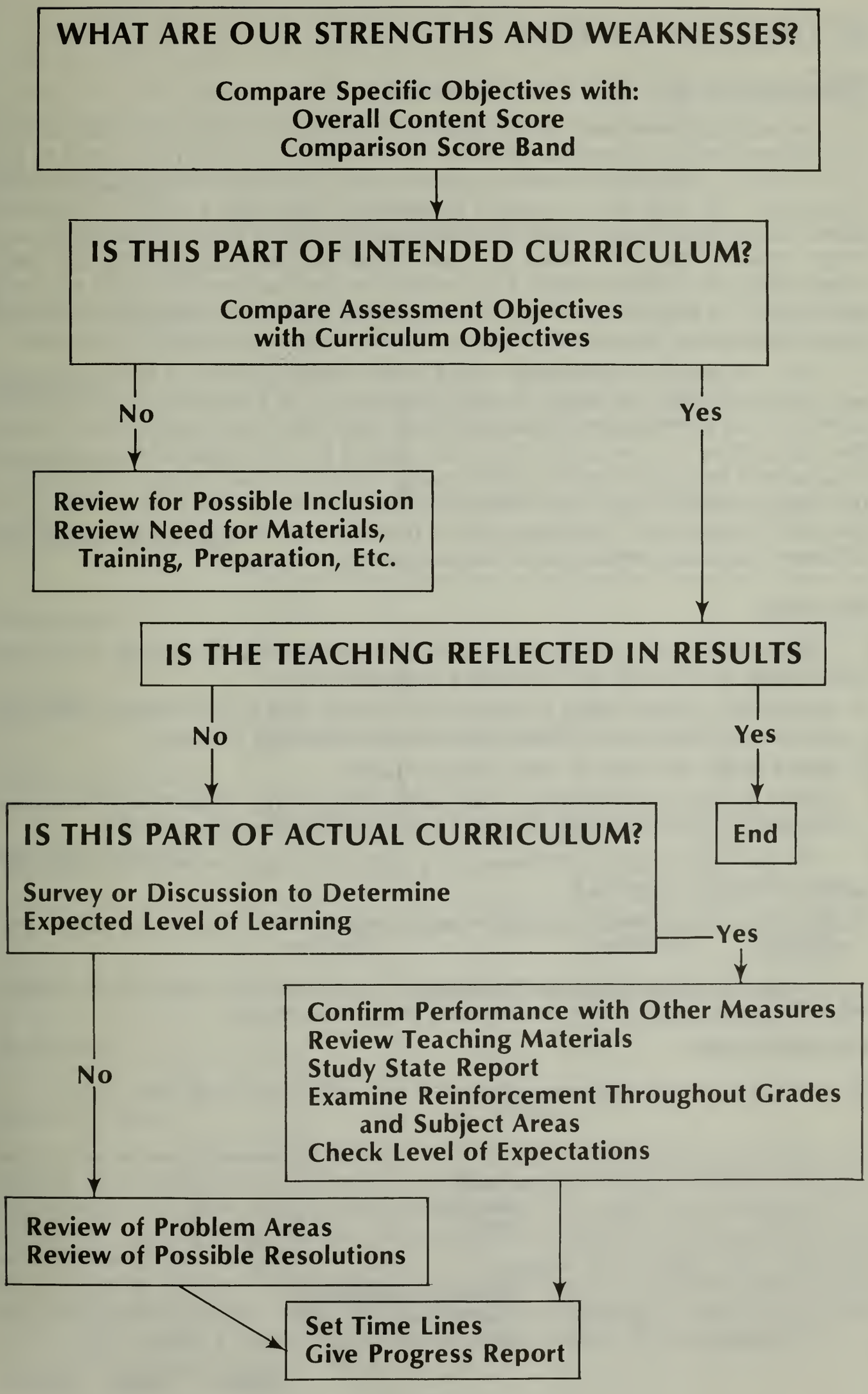
precedence. The impact of the assessment results begin to recede. For these and other reasons, it is important to do two things: set time lines and plan a report.

Time lines. Set realistic deadlines both for stages in your evaluation and for performance goals. A general time line can be anticipated, with deadlines for specific steps, such as teacher surveys or reviews of textbooks, to be decided along the way. In general, however, the fact that you have a time line and regard it seriously will help participants feel a sense of progress. Needless to say, this refers to student goals as well.

Report. Regular progress reports to faculty, school committee and parents will help focus attention on the overriding questions of "what have we learned in our evaluation?" and "what are we doing about it?" Reports should address perceptions and problems, as well as more tangible results. They will form an important public record of your progress in self-evaluation.

Conclusion

It is not the purpose of this handbook to tell you **how** to improve curriculum and instruction. There are other, better sources for this. The purpose of the handbook is to help you use the assessment reports to look at your curriculum and instruction and to ask the right questions. It assumes that, in the process of studying the various assessment reports and asking those questions, you will be in a better position to choose the right answers for your school.


WHAT ARE OUR STRENGTHS AND WEAKNESSES?
Compare Specific Objectives with:
Overall Content Score
Comparison Score Band
IS THIS PART OF INTENDED CURRICULUM?
Compare Assessment Objectives
with Curriculum Objectives
No
Yes
Review for Possible Inclusion
Review Need for Materials,
Training, Preparation, Etc.
IS THE TEACHING REFLECTED IN RESULTS
No
Yes
IS THIS PART OF ACTUAL CURRICULUM?
Survey or Discussion to Determine
Expected Level of Learning
End
Yes
No
Confirm Performance with Other Measures
Review Teaching Materials
Study State Report
Examine Reinforcement Throughout Grades
and Subject Areas
Check Level of Expectations
Review of Problem Areas
Review of Possible Resolutions
Set Time Lines
Give Progress Report

II. Objectives and Items

Frameworks for Test Development

Because an assessment is designed to cover a broad range of performance, a multidimensional conceptual framework, or matrix, is commonly used in test construction. Instead of considering items only in terms of their content, the test developer may also use a process dimension, reflecting a range of cognitive levels, in the selection of items. The filling of the "cells" in a content-by-process matrix assures that the items in a particular content category do not over-emphasize one cognitive level. This procedure can also provide useful reporting categories. For example, scores can be reported either by topic or by the kind of cognitive process (e.g., knowledge, understanding) demanded by the tasks.

The conceptual frameworks used in the development of the assessment were developed by the Massachusetts Department of Education, in consultation with advisory committees of teachers and curriculum coordinators from across the state. They are similar to those developed by the National Assessment of Educational Progress (NAEP). Additionally, one half to two thirds of the items in the Massachusetts tests were administered nationwide this past spring during the NAEP assessment. The remainder of the items were developed to reflect the different curricular emphasis of Massachusetts educators.

Reading

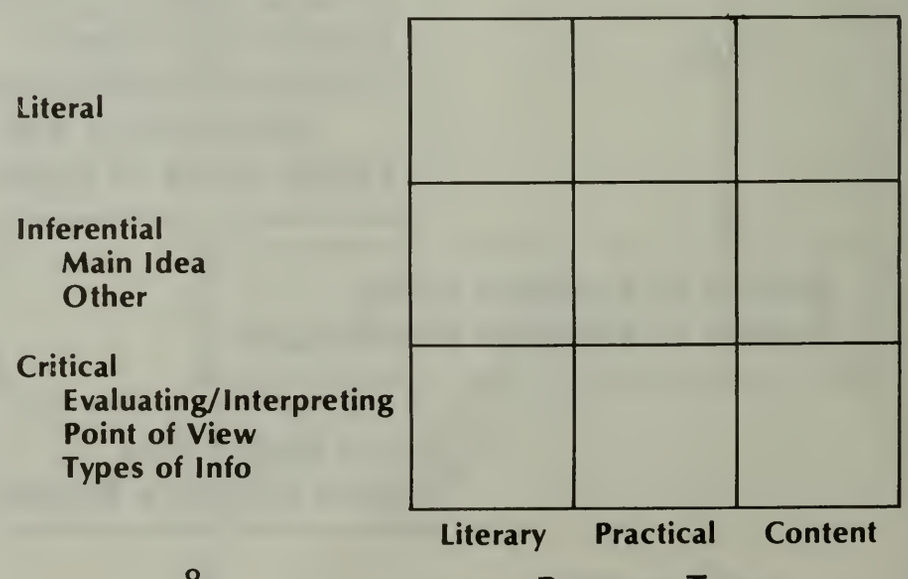
Three basic areas were covered in the assessment of reading. They were vocabulary, study skills and reading comprehension.

1. **Vocabulary.** Words were presented in context and as definitions. Analogies, prefixes and affixes were also presented under this category.
2. **Study Skills.** Included in this category were:
   Using Reference Materials, Following Directions, Classifying/Outlining/Notetaking/Summarizing, Reading Management/Test-taking Skills

   (At the Third Grade level these study skills subcategories were merged into a single reporting category.)
3. **Reading Comprehension.** This was assessed with the matrix below as a guide.

Comprehension refers to the kinds of understanding required in reading, while **Passage Types** refers to different kinds of content.

Comprehension



Note: Traditional reading comprehension skills overlap considerably with what current literature calls critical thinking skills, although items developed to measure the skills in these two domains do differ somewhat. Items were developed expressly to measure skills deemed important by critical thinking experts, and were assigned appropriately to the reading comprehension reporting categories.

Mathematics

The mathematics component of the assessment was developed to fit the content-by-process matrix below:

Content Categories

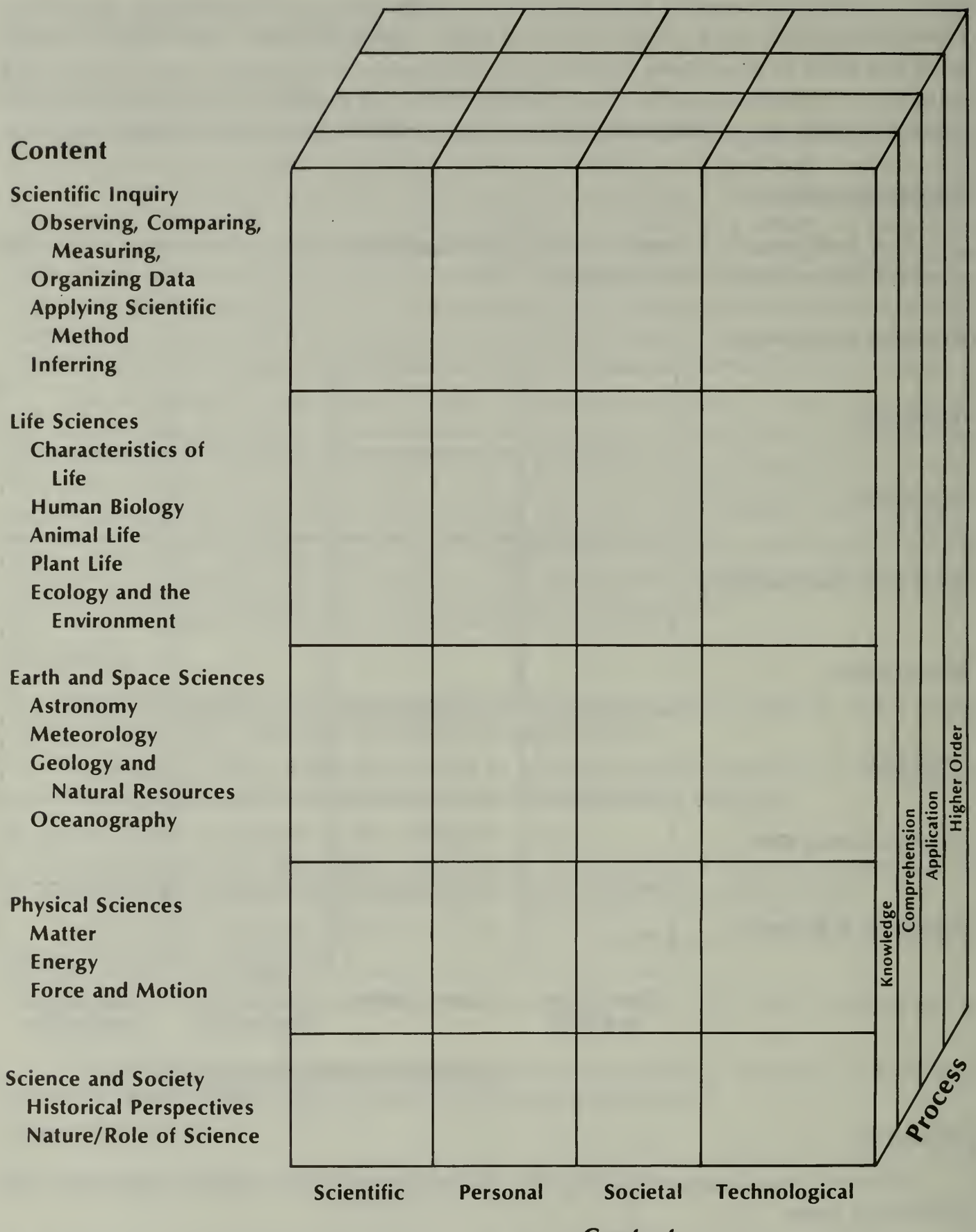
Numeration				
Operations				
Variables & Relationships				
Measurement				
Geometry				
Problem Solving Skills				
Probability & Statistics				
	Knowledge and Skill	**Understanding**	**Routine Application**	**Nonroutine Application**

Cognitive Process Categories

Science

Science was assessed using the three-dimensional matrix shown on the following page.

The Context dimension reflects the multiple applications of science in society. To exemplify the contexts, consider the fact that the process of decay uses oxygen. An item dealing directly with that fact would be categorized as "Scientific." Asking students why putting too much fish food in an aquarium can be harmful to the fish calls, in part, for the same knowledge, but could be categorized as "Personal." An item on the related impact of deforestation might be considered "Societal," while one dealing with technological advances addressing oxygen supply problems could be classified under "Technological."



Although test items in the content category "Scientific Inquiry" may relate in some way to biology, earth/space sciences or physical sciences, they generally do not require knowledge or understanding of a concept from one of those disciplines. Instead, those disciplines merely provide contexts for items addressing inquiry skills.

Not shown in the matrix above is the high level of emphasis the science committee felt was due the area of scientific inquiry in both curricular programs and tests. In aggregating components of the test to produce a school's total test

score in science, the components are weighted so that Scientific Inquiry counts as 50% of the score.

Reporting Categories and Sample Questions

Specific categories for which each school will receive scaled scores are shown along with the number of items in each category at each grade level. If no items are reported in a category at a particular grade level, then a separate score for that category is not reported to the schools.

A sample item is shown for each category. Unlike mastery tests or minimal competency tests which measure very specific objectives, an assessment provides broad coverage of content domains, and the items in a particular reporting category are as diverse as possible. As a result, in many categories, the sample items may not be representative of the other items in the categories. However, the sample items in this document should assist in explaining what is meant by some of the category names. The sample items are drawn from the item sets for all three grade levels tested. The grade level for each sample item is not indicated.

READING

Content Area

	Number of Items GR 3	GR 7	GR 11	
I. Vocabulary	18	15	25	**What does the word SQUARE mean in the phrase, "everyone in the city marches to the main SQUARE"?** ○ a four-sided shape ○ the largest building in a town ○ an open area in the center of town ○ a space on a playing board
II. Comprehension: Literal	27	25	28	**First, Maria** ○ performed at the Hollywood Bowl. ○ joined the New York City Ballet. ○ was named Woman of the Year. ○ danced with a ballet group in Canada.
Comprehension: Inferential **1. Main Idea**	8	8	11	**Which of these sentences states the main idea of the article?** ○ The swarms went from field to field, eating farm crops. ○ There are millions of them, people say. ○ You couldn't step without squashing dozens of grasshoppers. ○ And millions of grasshoppers meant big problems for farmers.
2. Other	21	36	53	**At the end of the story, Carla probably felt** ○ angry. ○ afraid. ○ excited. ○ lazy.
Comprehension: Critical **1. Evaluating & Interpreting**	16	18	15	**What is Vicki's best reason for being afraid of Basil?** A. Basil jumped out of the water behind Adam. B. Some wild creatures frighten easily and hurt people. C. Adam says, "He's curious about you." D. Una and Nini smile from their pen.
2. Point of View		10	14	**Which person's reaction to the proposed concert is MOST influenced by financial concerns?** A. Greta Bukowski B. Mary McHausen C. Russell Savois D. Tracy Savage

3. Types of Information	9	14	16
III. Study Skills	15	31	49
A. Using Reference Materials		11	15
B. Following Directions		8	12
C. Classifying/Outlining/ Notetaking/Summarizing		12	11
D. Reading Management/ Test-Taking Skills			11
Passage Types			
I. Literary	35	46	64
II. Practical	15	28	58
III. Content	46	64	51

Which statement below is NOT a fact?

- ○ He was the friendliest puppy in the world.
- ○ The little dog spied a squirrel.
- ○ Bonnie jumped and whistled.
- ○ Bonnie was getting worried about Rocky.

Where would you look to find more information on Bruce Springsteen?

A. In a history textbook
B. In the card catalog under "B"
C. In the *Reader's Guide to Periodical Literature*
D. In the "S" volume of the *World Book Encyclopedia*

According to the chart, when cleaning wool fabric you should never

A. dry clean.
B. wash in warm water.
C. use chlorine bleach.
D. use a medium temperature.

automobile
battleship
bicycle
canoe
motorcycle
rocket
sailboat
truck

Which one of the following sets of categories would NOT incorporate all of the items in the list?

A. vehicles of the land, sea, and air
B. commercial, military, and personal vehicles
C. vehicles propelled by an engine
D. various forms of transportation

What is the best way to read a recipe?

A. Read one line at a time as you are putting the ingredients together.
B. Read the whole recipe first, then go back and read each section as you need it.
C. Scan the recipe and look for the amounts of each ingredient.
D. Start reading from the end of the recipe and work your way to the beginning.

MATHEMATICS REPORTING CATEGORIES

Content Areas

I. Numeration

	40	37	41
A. Numeration			
	29	25	23

What fraction is shown by the shaded part of the circle?

- ○ $\frac{1}{2}$
- ○ $\frac{2}{1}$
- ○ $\frac{2}{3}$
- ○ $\frac{3}{2}$

B. Number Theory			
	11	12	18

Maria counts out loud by threes. George counts out loud by fives. Which number below will both say?

- ○ 6
- ○ 12
- ○ 15
- ○ 20

II. Operations

	39	91	100
A. Whole Numbers			
	23	25	28

Multiply: $\begin{array}{r} 52 \\ \times\ 4 \\ \hline \end{array}$

- ○ 28
- ○ 56
- ○ 208
- ○ 820

B. Fractions (IIB & C combined at GR 3)			
	12	14	14

$\frac{3}{5} + \frac{2}{7}$ is equal to

- A. $\frac{21}{10}$
- B. $\frac{5}{12}$
- C. $\frac{10}{21}$
- D. $\frac{6}{35}$
- E. $\frac{31}{35}$

C. Decimals			
		27	15

A book costs $5.25, and an airplane costs $2.75. How much more does the book cost than the airplane?

- ○ $2.50
- ○ $3.50
- ○ $7.00
- ○ $8.00

D. Percent			
		14	18

Linda's new bike cost $159.99 and the sales tax was 5%. How much did she pay including tax?

- A. $164.99
- B. $167.99
- C. $172.98
- D. $177.99

E. Integers (not reported GR 7)			
		3	10

$-8 + -4 =$

A. $+2$ C. $-\frac{1}{2}$ E. -12

B. -2 D. $+\frac{1}{2}$

F. Properties of Operations (not reported Gr 3, 7)

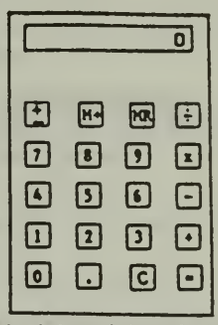
4 5 12

Which of the following is NOT a true statement?

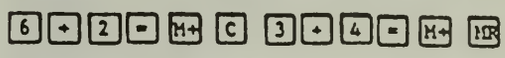
A. 8 + (3 x 2) = (8 + 3) x (8 + 2)
B. 5983 x 83 = 83 x 5983
C. 0 ÷ 1000 = 0
D. (18 + 12) + 8 = 18 + (12 + 8)
E. (14 x 8) x 7 = 14 x (8 x 7)

G. Calculators (not reported GR 3, 7, 11)

3 3



Using the calculator pictured above, Edward pushed the following buttons in the order shown:



What result did the calculator show?

A. 4
B. 7
C. 8
D. 15

III. Variables and Relations

14 22 76

A. Algebraic Manipulations

15

If x = 3 and y = 5, what does 3x + 4y equal?

A. 7
B. 8
C. 15
D. 29
E. 78

B. Relations/Functions

41

a	b
1	6
2	8
3	10
4	12

Which rule fits this table?

A. b = (3 x a) + 3
B. b = (2 x a) + 3
C. b = (3 x a) + 2
D. b = (2 x a) + 4

C. Equations/Inequalities

20

2x − 5 = 31. What is x?

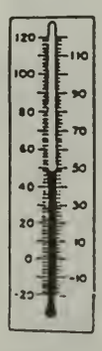
A. 36
B. 26
C. 18
D. 13

IV. Measurement

23 45 68

A. Using Instruments

9 11 15

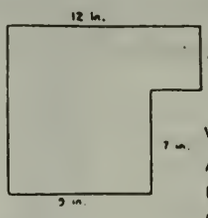


What temperature is shown on this thermometer?

A. 39°
B. 44°
C. 48°
D. 49°

B. Perimeter, Area, Volume (not reported GR 3)

5 16 27



What is the area of this figure?

A. 46 inches
B. 111 square inches
C. 2 feet, 8 inches
D. 23 square inches

C. Appropriate Units and Unit Equivalents

9 18 26

5,700 meters is equal to how many kilometers?

A. 5.7
B. 57
C. 570
D. 57,000

V. Geometry

28 37 63

Which of the following is true for all parallelograms?

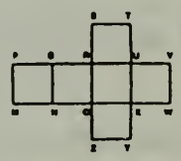
A. Opposite angles are equal.
B. All sides are equal.
C. The diagonals are equal.
D. Adjacent sides are perpendicular.

A. Plane and Solid Figures

12 27 41

B. Transformations and Spatial Visualization

16 10 22



The diagram shows a cardboard cube which has been cut along some edges and folded out flat. If it is folded to again make the cube, which two corners will touch corner P?

A. corners Q and S
B. corners T and Y
C. corners W and Y
D. corners T and V
E. corners U and Y

VI. Problem-Solving Skills

32 41 59

The four members of the Rogers family went to dinner at a restaurant where dinners cost from $6.00 to $10.00 per person. Afterwards, Mrs. Rogers left a tip for the waiter which amounted to about 15% of the cost of the family's meal. Which of the following would be the best estimate of the amount of the tip?

A. $0.70
B. $1.50
C. $5.00
D. $22.00

A. Estimation and Reasonableness

14 14 23

B. Strategies (note: B,C,D combined at GR 3 and B,C combined at GR 7)

18 13 11

Jim, Kay, and Len all live along the same road. Jim lives 12 miles from Kay. Len's house is 8 miles from Jim's house and closer to Jim's than to Kay's house. How far apart do Len and Kay live?

Which drawing below would help most to solve the above problem?

A. Jim 8 miles Len Kay
12 miles

B. Jim Len 8 miles Kay
12 miles

C. Jim 8 miles Len 12 miles Kay

D. Len 8 miles Jim 12 miles Kay

C. Relevant Information

9

Maria left at noon to take a trip on her bicycle. She rode 5 miles each hour. Later that afternoon Amanda decided to go after her. Amanda rode 10 miles each hour.

What else would you need to know in order to find how far the girls rode before Amanda caught Maria?

A. the type of bicycle Amanda rode
B. the time when Maria arrived at her destination
C. the time when Maria left
D. the number of miles Maria had ridden when Amanda left

D. Math Reasoning

14 16

Henry is older than Bill, and Bill is older than Peter. Then,

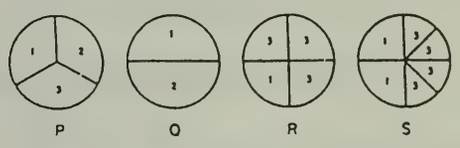
A. Henry is older than Peter.
B. Henry is younger than Peter.
C. Henry is the same age as Peter.
D. There is not enough information given to tell which is true.
E. I don't know.

VII. Probability/Statistics

14 39 60

A. Probability and Statistics (not reported GR 3)

5 24 42

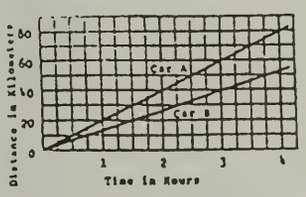


You WIN the game if 3 is spun. Which spinner would give you the best chance of winning?

○ Spinner P
○ Spinner Q
○ Spinner R
○ Spinner S

B. Graphs, Tables, Charts

9 15 18



Three hours after starting, car A is how many kilometers ahead of car B?

A. 2
B. 10
C. 15
D. 20
E. 25

Cognitive Process Levels

I. Knowledge and Skill

58 129 143

Multiply: 52 × 4

○ 28
○ 56
○ 208
○ 820

II. Understanding

63 80 142

Maria left at noon to take a trip on her bicycle. She rode 5 miles each hour. Later that afternoon Amanda decided to go after her. Amanda rode 10 miles each hour.

What else would you need to know in order to find how far the girls rode before Amanda caught Maria?

A. the type of bicycle Amanda rode
B. the time when Maria arrived at her destination
C. the time when Maria left
D. the number of miles Maria had ridden when Amanda left

III. Routine Application	**54**	**80**	**116**

A book costs $5.25, and an airplane costs $2.75. How much more does the book cost than the airplane?

- ○ $2.50
- ○ $3.50
- ○ $7.00
- ○ $8.00

IV. Nonroutine Application	**16**	**25**	**65**

There are six teams in a school volleyball league. If each team plays each other team once during the season, how many games are played during the season?

A. 6
B. 15
C. 30
D. 36

SCIENCE REPORTING CATEGORIES

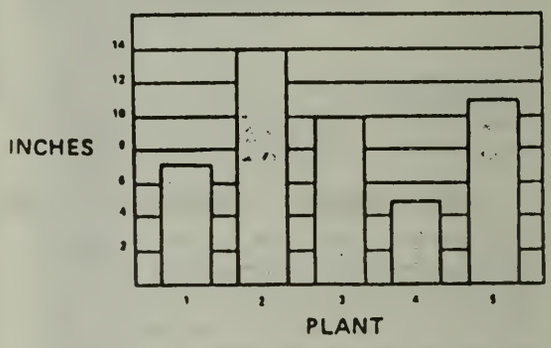
Content Areas

I. Scientific Inquiry	**45**	**49**	**73**
A. Observing/Comparing/Measuring	**11**	**9**	**12**

Each of 30 students measures the length of a playground. Which one of the following will be closest to the actual length?

A. the smallest result
B. the average of the ten largest results
C. the average of all thirty results
D. the average of the ten smallest results
E. the largest result

B. Organizing Information	**15**	**11**	**22**



Which plant grew the tallest?

- ○ Plant 2
- ○ Plant 3
- ○ Plant 5

C. Designing Experiments	**11**	**15**	**16**

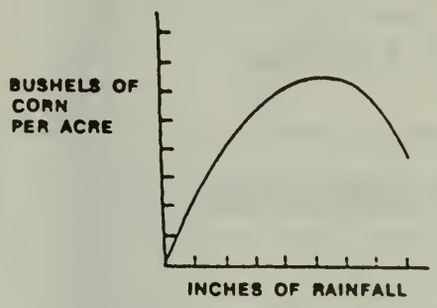
Sarah wants to compare the effects of breakfast cereal and lab food on the growth of mice. She could BEST do this by

A. feeding a mouse cereal and recording its growth.
B. feeding a mouse standard lab food and recording its growth; then switching it to a diet of cereal and recording its growth.
C. finding two groups of identical mice; feeding one cereal and one standard lab food and recording their growth.
D. feeding several mice standard lab food; then adding cereal to their diet to see if their growth rate changes.

D. Inferring

8 13 24

Which one of the following is the best conclusion you can make from this graph?



A. The more rain there is, the better the corn will grow.
B. Corn needs rain to grow, but too much rain is harmful.
C. Different kinds of corn need different amounts of rain to grow best.
D. Corn can grow well even if there is no rain.
E. I don't know.

II. Life Sciences

56 50 91

A mother dog and a father dog both had very long legs. Their puppy probably had

A. long legs.
B. short legs.
C. average legs.
D. There is no reason to expect anything about the puppy's legs.

A. Characteristics

12 11 25

B. Human Biology

25

A person who has diabetes cannot properly use what substance?

A. oxygen
B. protein
C. sugar
D. fat

C. Animal Life Science (includes IIB - GR 3,7)

16 20 11

Which of the following is an important function of the kidneys?

A. digest food
B. circulate the blood
C. produce red blood cells
D. remove waste materials from the blood

D. Plant Life

17 11 10

The oxygen we breathe is made by

○ the sun.
○ plants.
○ volcanoes.
○ other animals.

E. Ecology and Environment

11 8 20

In a particular meadow there are many rabbits that eat the grass. There are also many hawks that eat the rabbits. Last year a disease broke out among the rabbits and a great number of them died. Which of the following probably then occurred?

A. The grass died and the hawk population decreased.
B. The grass died and the hawk population increased.
C. The grass grew taller and the hawk population increased.
D. The grass grew taller and the hawk population decreased.
E. Neither the grass nor the hawks were affected by the death of the rabbits.

III. Earth and Space Sciences	**35**	**44**	**64**
A. Astronomy	**14**	**11**	**15**

Each year the Earth moves once around

A. Mars.
B. Venus.
C. the Sun.
D. the Moon.
E. all of the other planets.

B. Meterology	**9**	**10**	**17**

The statement that the relative humidity is 50 percent means that

A. the chance of rain is 50 percent.
B. the atmosphere contains 50 pounds of water per cubic mile.
C. the atmosphere contains 50 grams of water per cubic meter.
D. the atmosphere would be saturated with water if the air temperature were 50°F.
E. the atmosphere contains half as much water as it could contain at its present temperature.

C. Geology and Natural Resources (includes IIID at GR 3,7)	**12**	**23**	**23**

A fossil of an ocean fish was found in a rock outcrop on a mountain. This probably means that

A. fish once lived on the mountain.
B. the relative humidity was once very high.
C. the mountain was raised up after the fish died.
D. fish used to be amphibians like toads and frogs.
E. the fossil fish was probably carried to the mountain by a great flood.

D. Oceanography			**9**

As a diver goes farther below the ocean's surface,

A. the water gets colder, and the pressure becomes less.
B. the water gets warmer, and the pressure becomes greater.
C. the water gets colder, and the pressure becomes greater.
D. the water gets warmer, and the pressure becomes less.

IV. Physical Sciences	**24**	**46**	**117**
A. Matter		**18**	**56**

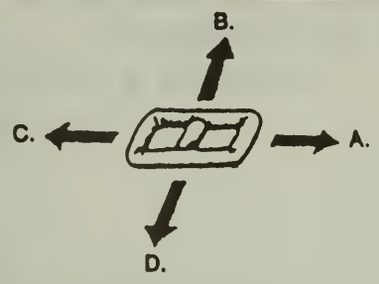
A different substance is formed when

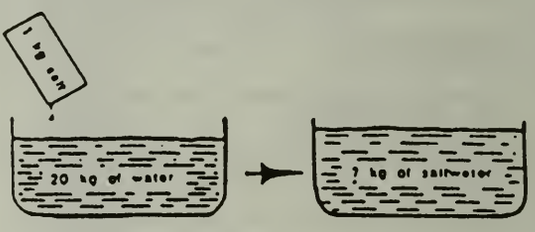
○ a cloth is cut.
○ a cup breaks.
○ a candle burns.
○ a piece of chalk falls apart.

B. Energy		**16**	**36**

Two astronauts walking on the moon are trying to communicate with each other. Which of the following ways of communicating will not work for them?

A. ringing a bell
B. flashing a light
C. using a radio
D. waving
E. I don't know.

C. Force and Motion		12	25	 A person dives off a raft in the direction indicated by Arrow A. Which arrow shows the way the raft would move? F. Arrow A G. Arrow B H. Arrow C I. Arrow D
V. Science and Society	9	29	55	A chemist discovers a new medicine which cures a particular illness. Which of the following activities would be most important in deciding if the medicine should be sold to the general public? A. a search for less expensive medicine that is almost as effective B. research on harmful side effects possibly caused by the new medicine C. decision making regarding a fair price to ask for the medicine D. an investigation of the chemist's competence, training, and reputation
Contexts				
I. Scientific	132	176	319	A neutral atom of oxygen contains A. protons and electrons only. B. protons and neutrons only. C. protons, neutrons, and electrons. D. alpha, beta, and gamma rays. E. alpha particles and beta particles only.
II. Personal	21	14	19	An average serving of which of the following foods would provide the most protein for building and repairing body tissues? A. boiled potatoes B. green beans C. lean meat D. oatmeal E. white bread
III. Societal	16	11	25	A chemist discovers a new medicine which cures a particular illness. Which of the following activities would be most important in deciding if the medicine should be sold to the general public? A. a search for less expensive medicine that is almost as effective B. research on harmful side effects possibly caused by the new medicine C. decision making regarding a fair price to ask for the medicine D. an investigation of the chemist's competence, training, and reputation

IV. Technological (note: III & IV combined at GR 3)		**14**	**31**	The development of which of the following made possible huge advancements in computer technology? A. particle accelerators B. electromagnets C. microcircuits D. electron tubes
Cognitive Process Levels				
I. Knowledge	**66**	**56**	**116**	A person who has diabetes cannot properly use what substance? A. oxygen B. protein C. sugar D. fat
II. Comprehension	**38**	**72**	**123**	The statement that the relative humidity is 50 percent means that A. the chance of rain is 50 percent. B. the atmosphere contains 50 pounds of water per cubic mile. C. the atmosphere contains 50 grams of water per cubic meter. D. the atmosphere would be saturated with water if the air temperature were 50°F. E. the atmosphere contains half as much water as it could contain at its present temperature.
III. Application	**15**	**32**	**73**	 One kilogram of salt is completely dissolved in twenty kilograms of water. The resulting saltwater will weigh A. nineteen kilograms. B. twenty kilograms. C. twenty-one kilograms. D. The weight is unpredictable.
IV. Higher	**50**	**54**	**83**	A chemist discovers a new medicine which cures a particular illness. Which of the following activities would be most important in deciding if the medicine should be sold to the general public? A. a search for less expensive medicine that is almost as effective B. research on harmful side effects possibly caused by the new medicine C. decision making regarding a fair price to ask for the medicine D. an investigation of the chemist's competence, training, and reputation

NOTES

ASSESSMENT ADVISORY COMMITTEES

The following committees were instrumental in insuring that the assessment reflected the concerns of Massachusetts educators.

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Rosario Alvarez
Gwendolyn Blackburn
Carmen Chico
Lesley Hergert
Thomas Hutchinson
Brenda Jochums
JoAnn A. Ortiz
Catherine Walsh

Reading Committee

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Helen Forsgard
N. Jerome Goldberg
Shirley M. Houston
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Patricia Tremblay
John J. Waite, Jr.
Claire J. Zalewski

MASSACHUSETTS DEPARTMENT OF EDUCATION
REGIONAL CENTERS

Al Trocchi
Northwest Regional Center
Mark Hopkins Hall
Church Street
North Adams, MA 01247
413/664-4511

Paul Burnim
Greater Springfield Regional Center
88 Massasoit Avenue
West Springfield, MA 01089
413/739-7271

Dorothy Earle
Northeast Regional Center
219 North Street
North Reading, MA 01864
617/664-5723

Laurie Slobody
Central Mass. Regional Center
Beaman Street, Route 140
West Boylston, MA 01853
617/835-6266

Peter Cirioni
Greater Boston Regional Center
75 Acton Street
Arlington, MA 02174
617/641-4870

Pat O'Brien
Southeast Regional Center
P.O. Box 29
Middleboro, MA 02346
617/947-1231

Advanced Systems IN MEASUREMENT & EVALUATION, INC.
MOSES PAUL HOUSE • 114 LOCUST STREET, DOVER, NEW HAMPSHIRE 03820